Description of Courses

▣ Undergraduate Program

BiS200 Bioengineering Fundamentals

This course discusses basic knowledges for interdisciplinary research area among biology, medical, information, electronic and mechanical engineering. This course, also, provides common tool for scientific understanding of biological operation mechanism, analysis of organism structure, and principle of life. Basic theory and tool for recognition and detection, analysis and treatment, control and handling, storage and usage of biomaterials and bioinformation are discussed.

BiS202 Cell Biology

A series of lectures on cell biological subjects; Cell composition, cell structure, Cell cycle regulation, cytoskeleton, Membrane, Transport, Protein Sorting are given in this course.

BiS208 Biochemistry II

This course is a continuation of Biochemistry I and begins with photosynthesis and the synthesis of biological macromolecules and their components. It focuses on DNA replication, recombination, and repair, RNA synthesis and splicing, and protein synthesis and activation, and also looks at how cells sense and adapt to environmental changes.

BiS221 General Biochemistry

This course covers basics of biochemistry for describing biological phenomena and its application to biological research.

BiS222 Molecular & Cellular Biology

This course covers fundamental topics in DNA chemistry, including: the structure and function of DNA, the biosynthesis of DNA, the regulation of gene expression, and the mutation and DNA repair.

BiS223 Physical Principles in Biological Engineering

This course covers physical principles including thermodynamics, mechanics, energetics, kinetics, transport phenomena, and molecular forces that are needed to study and model the structure and function of biological structures.

BiS225 Anatomy & Physiology

Human Physiology is a course designed to give students an introduction to the physiology (and anatomy) of the human body that would be basic knowledge for bio and brain engineering. The student will learn how the body works, how to maintain its normal functions and the consequences of injury or disease. Clinical aspects and

contemporary bioengineering application will also be introduced.

BiS232 Bio-Data Structures

This lecture introduces data structures and algorithms for computer programming. It covers design of data structures and algorithms for bio-data analysis.

BiS252 Bioinstrumentation Fundamentals

This course will introduce basic circuit analysis techniques that is useful for the design &analysis of biomedical instrumentation systems. Fundamental understanding of electrical circuit theory will be emphasized to model and interpret many physiological systems and phenomenon using basic circuit concepts.

BiS301 Bioengineering Laboratory I

This laboratory course provides the students with opportunities to understand and experience essential experiments in the bioengineering area. Especially, it focuses nano-molecular bioengineering.

BiS321 Systems Biotechnology

This course discusses the basic concepts of systems biology and practical applications of bioengineering to biomedical, food, environmental, energy and electronics industry. This course also covers the following topics in the field of new biotechnology: the nature of living things and the principles of manipulating them; enabling technologies; different approaches of biotechnology; specific applications such as medical, industrial, and environmental; and social issues such as intellectual property, regulations, biotech business, and biowarfare.

BiS328 Brain Science Fundamentals

This course will cover the basic aspects of neuroscience with emphasizing of mechanistic structure and function of neurons and networks of neurons. In addition, application of neuroscience of knowledge in engineering field will be introduced.

BiS332 Bio-Information Processing

This course introduces essential concepts and techniques in information processing for bio and brain engineering. Essential topics include information modeling and analysis for various biological data such as bio-molecular structures and bio-neuro networks. Students are required to develop their own bio-information systems to consolidate their understanding on those topics.

BiS335 Biomedical Statistics & Statistical Learning

This course will provide statistical foundation and a statistical analysis of high-dimensional biological and medical data, and advanced topics in statistical learning and application with information-rich biomedical data. All those issues are integrated and exemplified with real-world cases and practical tools.

BiS340 Interdisciplinary Approach to Network Science

In this course we introduce the basic analytical tools to network research, and study different networks with the tools. Different disciplines, such as sociology, political science, business, biology, physics, and computer science, bring their unique perspectives on network research.

BiS350 Bioengineering Laboratory Ⅱ

Instrumentation and computer interfaces are studied for bioinformatics and bioelectronics researches. We will first study data acquisition and output as well as Analogue-to-Digital and Digital-to-Analogue data conversion. Then, term projects will be conducted for measurements of biological signals such as EEG.

BiS351 Bio-Signal Processing

Signal processing algorithms for biological signals and their applications are studied. We first study linear system theory for the input-output relationship in time and frequency domains with Fourier transform. Then, z-transform of digital signal is studied, and DFT and FFT algorithms are introduced for frequency analysis. Frequency filtering with FIR / IIR filters and data analysis with PCA and k-means clustering are also studied.

BiS352 System Modeling in Bioengineering

Formal mathematical models such as Petri-nets, automata and hidden-Markov models are explained along with their properties and analysis methods, respectively. Bio-sequences, protein motifs, protein structures, metabolic pathways, signal pathways, and regulatory networks are represented and analyzed with such mathematical models.

BiS354 Analog Microelectronic Circuits

Basic operational principle and equivalent circuit models are introduced. Then, several circuits are studied for rectifiers, amplifiers, and differential amplifiers are investigated. Also, wide-band amplifiers, feedback, output stage, and OP amplifiers will be studied. Finally, several circuits are introduced for data conversion, frequency filtering, and oscillators.

BiS355 Digital System Laboratory and Bio-Applications

Digital logic is studied for understanding operation of computing systems. Also, digital system design and computer interface are studied. Especially, binary system, Boolian logic, combinatorial and sequential logic, and multiplier unit are investigated. Also, basic operation of microprocessors are studied, and several experiments will be conducted with microprocessors.

BiS371 Biofluidics

This course introduces basic concepts of biological transport phenomena and helps the design of micro/nanofluidic devices for medical and biotechnological applications.

This course also covers topics in biofluid mechanics, mass transport, and biochemical interactions, with engineering concepts motivated by specific biological problems.

BiS372 Dynamic Motion and Response

This course offers fundamentals of the kinematics and dynamics involved in the motion of biological and engineering systems. Focus has been placed on the understanding of the motion and dynamic behavior of the systems subject to external dynamic forces and moments. Topics include kinematics, particle and rigid body dynamics, motion and dynamic response, design and analysis of the biological and engineering systems.

BiS377 Biomechanics

This course offers fundamentals of the statics and mechanics involved in deformable biological and engineering structures. Focus has been placed on the understanding of the internal status and behavior of deformable bodies subject to external forces and moments at static equilibrium. Topics include static equilibrium, force and deformation, stress and strain, yield and failure, design and analysis of the biological and engineering structures.

BiS400 Special Topics in Bio and Brain Engineering

Recent research trends and new research topics are investigated in the field of BioSystems. Special emphasis is given to technologies related to fusion of bioinformatics, bioelectronics, and technology. The topic may be different for each course offering, and the topic may be used as the co-title.

BiS401 Special Topics in Bio and Brain Engineering(1)

Recent research trends and new research topics are investigated in the field of BioSystems. Special emphasis is given to technologies related to fusion of bioinformatics, bioelectronics, and technology. The topic may be different for each course offering, and the topic may be used as the co-title.

BiS402 Special Topics in Bio and Brain Engineering(2)

Recent research trends and new research topics are investigated in the field of BioSystems. Special emphasis is given to technologies related to fusion of bioinformatics, bioelectronics, and technology. The topic may be different for each course offering, and the topic may be used as the co-title.

BiS410 Bioengineering Senior Project

Students learn how to integrate the bio-information, bio-electronics and bio-nano technologies while designing and implementing bio-fusion systems. All research teams are required to present the results, and write a paper.

BiS422 Science Communication & Leadership

'Science Communication and Leadership' provide students with scientific (or technical)

writing for the public and presentation to the scientists and the public. It also provide them with an opportunity to improve their own leadership.

BiS423 Molecular Biology

This course covers fundamental topics and experimental techniques of cellular and molecular biology. Special topics include transcription, translation, and DNA replication, etc.

BiS424 Instrumental Analysis for Biomaterials

Basic principles and applications of analytical chemistry and instruments in biological sciences will be covered and discussed in this course.

BiS425 Biotechnology Laboratory

The objective of this experimental course is to provide students with the basic skills and knowledge for biochemistry and molecular biology.

BiS427 Computational Neuroscience

Information coding and unsupervised learning in biological neural systems are studied. We will first study simple neuron models for neural pulse generation and information representation. Then, self-organizing learning algorithms of massive neural systems will be introduced, and their clustering and Classification performance will be studied.

BiS428 Introduction to Clinical Neuroscience

This course will introduce neurological diseases and psychiatric disorders which give perturbation to nervous system. This will give students more understanding of nervous system and application of bioengineering technique for diagnosis, treatment or rehabilitation.

BiS429 Brain-Inspired Machine Intelligence

This course aims to understand the nature of biological intelligence through the lens of machine learning. The course covers algebra, geometry, and neuroscience of deep learning. Students are expected to develop an ability to understand commonalities and differences between artificial and biological neural networks and master mathematical principles of neural networks and the necessary skills to make the best use of machine learning theory to understand how and why the biological neural networks work.

BiS437 Bio-Data Engineering

This course introduces essential concepts and techniques in computer software and hardware for developing biosystems. Core software techniques including operating systems, database systems, and artificial intelligence are explained.

BiS438 Bioinformatics

Algorithms and application programs in bioinformatics for studying BioSystems are discussed. Topics include bio-database search, sequence alignment, gene prediction, protein structure prediction, microarray data analysis, and biological network.

BiS451 Cognitive Neuroscience

Human cognitive functions are understood and their mathematical models are developed. We first study measurement techniques for brain signals such as EEG and fMRI. Then, cognitive models are developed for learning, memory, language, emotion, and behavior.

BiS452 Biomedical Imaging

The goal of this course is to have students understand biomedical imaging systems such as X-ray, CT, SPECT, PET, Ultrasound, and MRI. The class includes physics for biomedical imaging systems and basic theories for signals and systems, image reconstruction algorithms like fast Fourier transform and filtered backprojection, computer simulations for image formation, MRI Bloch equation simulations, etc.

BiS456 Methods for Neuroimaging

Neuroimaging is burgeoning due to neurological, neurosurgical and neuropsychological advances, which require increasingly sophisticated imaging techniques. As well, the technology which allows the neural axis to be imaged is rapidly advancing, as are post-processing and image analysis techniques. The scope of neuroimaging applications range from laboratory-type research, through translational medicine, clinical application, physics and engineering, mathematics and statistics, as well as informatics and computing sciences. This course will introduce students to cutting edge neuroimaging basic sciences, techniques, applications in research and clinical situations, neuroanatomy, safety issues and practical applications.

BiS470 BioNanoEngineering

This course offers science and technology fundamentals involved in BioNanoEngineering. Topics include the principles, materials and applications of electromechanical, thermofluidic, biochemical and optoradiative functions in bio-oriented and bio-inspired nanoengineering systems.

BiS471 Bio-Inspired Systems

This course provides scientific foundation and engineering platform for the bio-inspired systems, where bio-inspired sensors, actuators and controllers are linked together to achieve new or advanced functions. Topics include the physical and functional analogy of biological and engineering systems; the principles and methods of sensory, locomotive and neural functions; the quantitative analysis and engineering design of bio-inspired systems. Required are the technical reporting and the oral presentation of term projects on bio-inspired systems for applications to the areas of information and communication, electronics and appliance, automotive and aerospace,

biomedical diagnosis, environmental monitoring and/or industrial instrumentation.

BiS472 Micro Heat & Mass Transfer

This course discusses analysis tool and phenomenon of heat and mass transfer in microregion, and provides micro heat transfer through conduction, convection and radiation. Also, basic principles and applications of material diffusion and reaction are discussed.

BiS473 Bio-Nano Laboratory

This course provides hand-on experiences on the microfabrication and characterization of bio-oriented and bio-inspired microelectromechanical systems (bio-MEMS). Lecture and laboratory topics include the basic fabrication technologies and process monitoring methods for bio-MEMS devices for BINT (Bio-Information-Nano Technology) applications. Required are the experimental work and laboratory reports on the fabrication process and characterization results. Submission and oral presentation of final term papers are also required.

BiS481 Collective Intelligence in Biomedical Applications

This course teaches recent trends in IT-medicine convergence, especially on basic techniques and applications of collective intelligence(CI) for biomedical informatics domain. Case studies and projects will be offered in topic areas such as biomedical knowledge management, data mining, and CI.

BiS490 Graduation Research

BiS495 Individual Study

BiS496 Seminar

▣ Graduate Program

BiS500 Bioinformation and Bioelectronics

This course discusses recent research trend of interdisciplinary research area among biology, medical, information, electronic and mechanical engineering. By providing the newest research method and application of bioelectroinformatic systems, this course serves design, analysis and development ability for bioelectroinformatic systems.

BiS502 Bioanalytical Technology

Analytical targets in Biochemistry/Biology include small molecules with biological activities, bio-macromolecules (proteins, nucleic acids, carbohydrates, and lipids), cells, and animals. Depending on the analytical targets, hence, the various analytical methods have been developed. In "Introduction to Bioanalysis" course, 8~9 adjunct professors mainly involved in KAIST-KRIBB BINT Convergence Center will give lectures, consisting of 14 lectures and 2 examinations, under the subject "principles and

applications of various bioanalytical methods".

BiS510 Technology Commercialization and Venture Business

Technology Commercialization and Venture Business provide students with theoretical and practical basis for commercialization of cutting edge technologies and establishment of venture business.

BiS521 Biology for Engineers

This course deals with biology fundamentals and associated subjects required for engineers to understand and acquire multidisciplinary technology in the fused areas of biological sciences and engineering. To accommodate those who do not have the biological background, the course covers the biological principles and engineering applications of general biology including: biochemistry, genetics, and physiology. Subsequently, special emphasis is placed on applying engineering concepts to biological problems.

BiS522 Genomics and Proteomics

This course describes the determination of the nucleotide sequence as well as many further analyses used to discover functional and structural gene information on all the genes of an organism. This course deals with the basic genetic analysis on a genome-wide scale.

BiS523 Information and Electronics for Scientists

This course is designed to provide basic knowledge on the information and electronics for the biosystems education and researches. The first half will be devoted to C language, while selected topics from undergraduate Electrical Engineering courses will be taught at the second half.

BiS524 Biopharmaceuticals

This course offers scientific and engineering principles related to biopharmaceuticals, new paradigm for disease treatment and dignosis.

BiS525 Brain Dynamics

This course describes various brain functions with a dynamical point of view and briefly reviews the theoretical aspects of brain functions using nonlinear dynamics and information theory.

BiS526 Methods in Neuroscience

'Methods in Neuroscience' is designed for graduate students to provide with neuroimaging technologies to monitor neural activities. We introduce novel imaging technology like two-photon microscope and NIRS and how they offer insight in how the brain works.

BiS527 Theory of Brain Function

This course will cover theoretical aspects of how the brain processes information. It

will cover all levels from molecular to cellular to systems to behavior and human perception. It is distinguished from other courses and textbooks by its emphasis on concepts of probability and information

BiS528 Cognitive Design and Interface

Cognitive Design and Interface (CDI) indicates the design of products and systems based on human cognition such as prototypes, the software, user interface (UI), on/off-line services, the strategy planning, the marketing, the problem solving, etc. The traditional product design and service planning have performed based on intuitive, unquantifiable methodology. However, using neural measurement (EEG, fMRI, Eye movement, and so forth), we can understand human's intention, preference and response to droducts, service, system, and brands and can predict people's behavior. This class introduces basic concepts of cognitive design and interface and many examples of CDI in various fields of fast moving consumer goods and ergonomics-based service. This course also pursues the convergence learning encompassing diverse academic fields. As a term project, we develop User Interface for automobile system based on cognitive design and interface.

BiS529 Neural Basis of Spatial Cognition

This course provides an overview of the neural representations and computations that make up the brain's "GPS system" and how such circuits might more generally support other cognitive abilities such as the representation of temporal information, episodic memory, and the organization of abstract concepts. We will discuss the potential application of this scientific knowledge to creating methods and tools for prediction and enhancement of spatial cognition and memory performance.

BiS531 Genome Bioinformatics

Fundamental bioinformatics techniques including sequence analysis, genomic sequencing, protein motif analysis, cDNA chip data analysis, SNP analysis, 2D PAGE and MALDI analysis, and pathway analysis, are explained for bioinformatics software developers and practitioners.

BiS532 Bioinformatics Laboratory

The operation principles and application methods of essential bioinformatics software are exercised, which include sequence search, multiple sequence alignment, motif search, mRNA expression analysis, protein expression analysis, metabolic pathway analysis, signal transduction analysis, regulatory network, and so on. In addition, search methods for various bio-databases are exercised.

BiS533 Computing Technology

Strength and limitation of modern computing technology is discussed fundamentally in depth. It manifests the inherent characteristics of bio-information and electronics systems based on modern computing technology. This insight leads to creative discussion about novel computing paradigms

based on biological principles.

BiS534 Systems Biology

This course is an introduction to systems biology with a particular focus on interdisciplinary approaches to unravel complex requlatory mechanisms in various life phenomena.

BiS536 Proteome BioInformatics

Information processing techniques for genomics and proteomics are discussed. After introducing the principles of various genomics experiments, informatics techniques for gene discovery, comparative genomics and gene expression analysis are discussed. In addition, proteome informatics for protein expression analysis, protein-protein interaction analysis and virtual cell simulation is discussed.

BiS551 Medical Image Processing

Processing and visualization of biomedical images are studied for medical diagnosis. Basic theories for biomedical image acquisition, processing, visualization, image fusion and registration, 3-D visualization, and virtual reality for medical operations are discussed.

BiS552 Digital Biomedical Signal Processing

Advanced digital signal processing techniques are discussed for biological signals. Especially, digital signal processing methods are studied for detection, wavelet, time-frequency joint representation, and FIR/IIR filters. Also, Wiener, Kalman, eigen, and LMS adaptive filters are studied with their applications to biological signals.

BiS553 Biophotonics

This course teaches fundamental principles and contemporary applications of biophotonics. It will cover ray and wave optics, fiber optics, photonics semiconductors and biophotonic materials for understanding modern biophotonic sensing and imaging techniques.

BiS554 Neural Networks

Theory, applications, and implementations are studied. We first introduce two basic learning rules, i.e., Hebbian learning rule and error back-propagation rule, and discuss network architectures and learning algorithms for several neural network models. Major applications and neuromorphic hardware implementations are also studied.

BiS571 BioElectroMechanics

This course provides electromechanics for understanding and analysis of biomechatronic systems. An analogy between mechanical systems and electrical systems, modeling of electromechanical systems, and working principles of biomedical, diagnostic, surgery and therapeutic equipments are discussed.

BiS572 Microtransducers and Laboratory

This course discusses working principles, materials, configurations and performance specifications of microtransducers based on MEMS technology. On these basis, experiments using mechanical, electrical, optical, thermofluidic and biochemical microtransducers, are provided.

BiS575 Nanobiophysics

We will explore the assembly structures and interactions (van der Waals, electrostatics, etc) of biological molecules - DNA, cell cytoskeletal proteins (microtubules, and actin, etc.) - as well as the modern experimental techniques (synchrotron x-ray/ neutron scattering, electron micrography, AFM, etc)used to study the nanoscale structures.

BiS622 Metabolic Engineering

This course introduces the basic theory and practical applications of metabolic engineering offering systematic analysis of complex metabolic pathways and ways of employing recombinant DNA techniques to alter cell behavior, metabolic patterns, and product formation.

BiS627 Clinical Neuroscience

This course will introduce neurological diseases and psychiatric disorders which give perturbation to nervous system. This will give students more understanding of nervous system and application of bioengineering technique for treatment or rehabilitation.

BiS628 Learning and Memory Systems

This course aims to provide basic concepts of learning and memory based on human behavioral research using functional magnetic resonance imaging (fMRI), and animal research combined with electrophysiology and molecular/cellular biology, focusing on memory systems in the brain. In addition, the class also provides opportunities for group activities and discussions about how these fundamental concepts can be applied to our real life.

BiS631 Data Mining

Data mining techniques to discover useful patterns and regularities from the vast amount of bio-data are explained. After understanding the principles of representative data mining tasks such as classification, clustering, and association discovery, actual experiments using existing data mining software systems are performed.

BiS632 Bio-Statistics

Statistical principles and techniques such as probability distribution, hypothesis testing, regression, principal component analysis, which can be applied to various bioinformatics tasks, are introduced. Such statistical techniques are explained along with their applications to bio-sequence homology search, structure homology search, mRNA expression analysis, protein expression analysis, and so on.

BiS633 Bio-Intelligence

The principles and applications of intelligent systems, simulating and representing bio-mechanism, are discussed. After introducing genetic algorithms, evolutionary computing, fuzzy computing, and artificial neural networks, creative ideas for novel computing paradigms are discussed.

BiS634 Database Construction

System architectures and database design methodologies for constructing bio-databases are discussed. Client-server and web-based architectures are introduced, and the three-step database design procedure consisting of conceptual, logical, and physical design are explained. In addition, integration techniques of multiple heterogeneous bio-databases are examined.

BiS651 Hearing and Auditory Model

We study basic concepts of acoustic wave propagation and scattering, and human auditory systems based on cognitive, acoustic, and signal processing perspectives. By analysing huge amounts of cognitive science experimental data, we propose mathematical models for non-linearity, time-adaptation, masking, etc. Also, the connection of this data to information theory is investigated, and finally, applications to speech recognition are studied.

BiS652 Human Visual Model

Human visual system is studied with cognitive scientific and signal processing perspectives. By analysing huge cognitive science experimental data, we will come up to mathematical models. Also, its connection to information theory is investigated, and finally applications to real-world image recognition and target tracking are studied.

BiS653 Advanced MRI Techniques

This class covers the basic MRI principles and advanced MRI techniques including angiography, diffusion-weighted and diffusion tensor imaging, perfusion-weighted imaging, functional MRI, etc. Students will be asked to perform pulse sequence programming for some of these imaging techniques to be implementable in an MRI equipment.

BiS671 Nanomaterial Process and Behavior

This course treats the topics of properties, behaviors and controls of nanoparticles, and introduces machining processes of nanomaterials. Stability, reproducibility and reliability of nanoparticles and nanomaterials are discussed.

BiS672 Nano Electro Mechanical Systems

This course discusses physical phenomena and engineering problems arising from nanometric area. Topics included are analysis of the nano physical principles and design of the working principles, nano materials and its fabrication processes, and

nano testing and chacracterization techniques. This course also provides basic knowledge of the Nano Electro Mechanical Systems (NEMS). Term projects and presentation are required.

BiS673 Bioelectronic Devices

This course covers advanced topics in the design and industrial application of bioelectronic devices such as biosensor and biochip. The fundamental principles in these areas have emphasized to understand the biological recognition mechanism of enzyme, antibody, microorganism, animal cell, and DNA.

BiS675 Biomimetics in Biomedical Engineering

Biomimetics refers to human-made processes, substances, devices or systems that imitate nature. In particular, we will discuss the biomimetic approaches for biomedical engineering, in the context of creation of functional biological platforms, materials, devices, novel bioprocesses, and human disease models. The course will focus on methods and materials that exist in nature and those that were inspired by natural processes or organisms. It is designed to provide students with an introduction to biological materials, methods, mechanisms, and organizational principles, as they exist in nature. We will also cover the man-made technologies and engineering advancements that have been inspired by or created to mimic biology.

BiS721 Computational Cell Biology

'Computational Cell Biology' provide students with dynamical modeling in cell biology. It also provide them with new paradigm for understanding biological systems as complex systems.

BiS722 Cell Signaling Network

'Cell Signaling Network' provide students with fundamental understanding of intracellular signaling and intercellular communication. It also provide them with new concept of drug development targeting cell signaling.

BiS723 Advanced Cognitive Neuroscience

This course will provide students with a general introduction to underlying biological principles and mechanisms which give rise to complex human cognitive function and behavior. This will also include functional brain image methods, neuropsychological measurement to assess cognitive function and introduction of psychiatric and neurological disease. Students will have chance to present and discuss on classical or updated articles and their own projects.

BiS731 Bio-Pattern Recognition

Pattern recognition techniques for bio-images such as DNA chip images and electrophoresis images are discussed. After explaining deterministic, statistical, and syntactic pattern recognition principles, the feature extraction / selection and noise handling

problems for bio-images are discussed.

BiS732 Bio-Network

Formal representation and analysis of bio-processes including metabolic pathways, signal transduction pathways, and regulation networks are examined. After broadening the understanding of formal representation tools such as graphs, Boolean networks, and Bayesian networks, individual research projects for bio-network modeling are carried out.

BiS735 Computer Graphics and Bio-Application

After basic concepts and techniques of computer graphics are discussed, essential techniques to model and represent bio-molecules such as mRNA and proteins, and various organs are discussed in two and three dimensional space. In addition, representative bio-information graphics systems are introduced.

BiS752 Neural Engineering

This course covers basic principles, theories, and methods in several important areas in the field of neural engineering including neural prostheses, brain-computer interface, and neuro-microsystems.

BiS771 Nanobiotechnology

This course discusses microenergy conversion and transfer as well as the property and behavior of micromaterials based on mechanical, material, physical, chemical and biological analysis of biomedia and their reactions. Topic included are nanoscale phenomena in cellular physiology / metabolism, micro / Nano fabrication processes with unusual materials, microfabricated tools for neuroscience, biological motors and nanobiochips.

BiS772 Nano/Micro-Machining Process Laboratory

This course discusses equipments and processes of nano / micro fabrication. Also, practices of nano / micro fabrication are provided. Term projects and presentation based on design, fabrication and test of nano / micro devices are required.

BiS773 Nanotechnology in Medicine

This course will focus on the fundamental properties, as well as synthesis and characterization of nanomaterials, coupled with their applications in medicine. The medical applications covered will generally be cancer, cardiovascular disease, and brain disease.

BiS800 Special Lectures in Bio & Brain Engineering

Recent research trends and new research topics are investigated in the field of bioinformatics and bioelectronics. Special emphasize is given to technologies related to fusion of bioinformatics, bioelectronics, and technology. The topic may be different for each course offering, and the topic may be used as the course co-title.

BiS801 Special Lectures in Bio & Brain Engineering (1)

Recent research trends and new research topics are investigated in the field of bioinformatics and bioelectronics. Special emphasize is given to technologies related to fusion of bioinformatics, bioelectronics, and technology. The topic may be different for each course offering, and the topic may be used as the course co-title.

BiS802 Special Lectures in Bio & Brain Engineering (2)

Recent research trends and new research topics are investigated in the field of bioinformatics and bioelectronics. Special emphasize is given to technologies related to fusion of bioinformatics, bioelectronics, and technology. The topic may be different for each course offering, and the topic may be used as the course co-title.

BiS810 Leadership & Communication

Leadership & Communication provides students with scientific (or technical) writing skill for the public and presentation skill to the scientists and the public. It also provides them with an opportunity to improve their own leadership to be creative leaders for future.

BiS960 Thesis/Dissertation Research (Master)

BiS965 Individual Study (Master)

BiS966 Seminar (Master)

BiS980 Thesis/Dissertation Research (Doctoral)

BiS986 Seminar (Doctoral)

BiS987 Biofusion Seminar

In this course, graduate students provide an oral presentation on their recent ongoing work in order to have comments from students and professors in other research fields within bioengineering.